URS

September 29, 2011

Mr. W. Owen Thompson
Remedial Project Manager
Superfund Remedial Response Section Seven
U.S. EPA Region 5, SR-6J
77 W. Jackson Blvd.
Chicago, IL 60604
Phone (312) 886-4843
Machine Fax (312) 353-8426

Subject: Submittal of Additional DNAPL Recovery Well / Slurry Wall Design and Work Plan
Detrex Source Control Area – Fields Brook Superfund Site
Detrex Corporation, Ashtabula, Ohio
Docket No. V-W-98-C-450

Dear Mr. Thompson:

On behalf of Detrex Corporation (Detrex), URS Corporation (URS) is submitting the *Additional DNAPL Recovery Well / Slurry Wall Design and Work Plan* for review by the United States Environmental Protection Agency (USEPA). This Work Plan includes topics discussed with USEPA during our conference call in August 2011. Upon approval of this Work Plan, Detrex will begin implementation of the project schedule that was included. Please note that we have included a revised scheduled (Appendix B) to account for additional work including OM&M activities and preparation of the ESD in 2012.

If you have any questions regarding this submittal, please do not hesitate to contact me at 216-622-2432 at your convenience.

Sincerely,

**URS Corporation - Ohio**

Martin L. Schmidt, Ph.D.
Vice President

Enclosure

cc: R. Currie – Detrex Corporation
T. Steib – Detrex Corporation
T. Doll - Detrex Corporation
R. Williams – Ohio EPA
W. Earle - SulTRAC

URS Corporation
1375 Euclid Avenue
Suite 600
Cleveland, OH 44115
Tel: 216.622.2400
Fax: 216.622.2464
www.urscorp.com

**WORK PLAN**

# ADDITONAL DNAPL RECOVERY WELL / SLURRY WALL DESIGN AND WORK PLAN

DETREX RD/RA SOURCE CONTROL AREA
DETREX FACILITY
ASHTABULA, OH
DOCKET NO. V-W-98-C-450

*Prepared for*
Detrex Corporation
Ashtabula, OH

September 2011

1375 Euclid Avenue
Suite 600
Cleveland, OH 44115
(216) 622-2400
Project No. 13814613

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This Work Plan has been prepared in response to a March 28, 2011 letter from the United States Environmental Protection Agency (USEPA), and subsequent discussions concerning the installation and operation of additional dense non-aqueous phase liquid (DNAPL) recovery wells at the Detrex Corporation (Detrex) Facility (Site) located in Ashtabula, Ohio (see **Appendix A**). This letter cited the RD/RA Source Control Area Interim Operations, Maintenance and Monitoring Manual (OM&M). As described in the OM&M Plan, Detrex proposes to install enhanced fluid recovery wells and a revised approach for DNAPL recovery. Additionally, USEPA provided Detrex with a requested response to the handling of on-site DNAPL impacted soils with respect to the proposed installation of the DNAPL recovery wells and other investigative derived soils from the proposed field work in and around the DNAPL source area (i.e., former lagoon area) of the Site. Following receipt of the March 28, 2011 and subsequent meetings, Detrex indicated to USEPA that it would be preparing a Work Plan, documented herein.

This Work Plan describes procedures for installing a series of additional DNAPL recovery wells, completing a Membrane Interface Probe (MIP) investigation, a preliminary conceptual design for a slurry wall downgradient of the DNAPL source area, and the associated on-site management of soils generated during the installation of these systems. In addition, this Work Plan will provide information related to Operations, Maintenance & Maintenance, Health and Safety, and Performance Monitoring Addendums that will be required in order to accommodate the installation and operation of the enhanced DNAPL recovery system at the Site. The existing Interim OM&M Plan will not be completely revised, but will include new sections to describe modifications to the existing DNAPL recovery system, including the new recovery wells operation of the Mobile DNAPL Recovery Unit (MDRU). The revised OM&M Plan will be submitted upon completion of the recovery well installations. Detrex will also update the existing site-specific Health & Safety Plan (HASP) to reflect the fieldwork outlined as part of the proposed Scope of Work. Finally, Detrex will prepare a Performance Monitoring Plan to discuss how the existing and new DNAPL recovery wells will be integrated and used in conjunction with the MDRU.

## 1.1 HISTORY & BACKGROUND

Detrex Corporation (Detrex) operates a facility at 1100 North State Road in Ashtabula, Ohio. **Figure 1-1** depicts the general location of the Detrex Facility. On February 26, 1998, the United States Environmental Protection Agency (USEPA) issued a Unilateral Administrative Order (UAO) and a Scope of Work for Remedial Design and Remedial Action for the Detrex Source Area (the UAO SOW) requiring that Detrex develop plans and specifications for remedial measures at the facility.

Phase I Remedial Investigation/Feasibility Study (RI/FS) Source Control environmental assessment investigations identified an area in the northeast corner of the Detrex Facility where soil and groundwater have been impacted by chlorinated volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). Soil borings and monitoring wells in this area have also identified a DNAPL layer that contains these VOCs and SVOCs. The area was formerly occupied by a series of settling ponds that were taken out service and backfilled with soil. The former ponds were associated with manufacturing operations that have been discontinued at this facility.

Technical Memorandum 3 (W-C, May 1997) included a feasibility study that identified several conceptual remedial alternatives for the Detrex site. The USEPA selected Alternative No. IV in the Source Control Record of Decision (ROD) issued September 1, 1997, to address the environmental conditions identified at the facility and prevent recontamination of sediment within Fields Brook. Alternative IV included:

- A downgradient vertical barrier wall (slurry wall);
- A groundwater collection trench upgradient of the slurry wall;
- A groundwater collection trench beneath the DS Tributary;
- Removal of sediments from the northern drainage ditch;
- Re-grading activities in the northeastern portion of the property;
- Removal of the catalyst pile materials; and
- Installation of a DNAPL recovery system.

Each of the action items, with the exception of the DNAPL recovery system, was addressed in the Plans and Specifications for Remedial Design/Remedial Action dated February 17, 2000. A Remedial Action Work Plan for those activities was issued on August 28, 2000 and work was initiated in September 2000. The slurry wall, collection trenches sediment excavation, site grading and catalyst pile removal were completed in March 2001.

The Plans and Specifications for DNAPL recovery system were issued at the 100 percent level on April 13, 2001. As agreed with USEPA, 12 of the 36 proposed recovery wells were installed in order to evaluate the DNAPL recovery system design as a pilot study prior to full-scale implementation. Construction of the pilot DNAPL recovery system was completed in October 2002. Since October 2002, modifications to the DNAPL recovery system, which have been completed and documented in quarterly reports, submitted to USEPA.

Based on the data collected to-date, Detrex is proposing further enhancements to the existing DNAPL recovery system. The proposed enhancements focus on the northern perimeter of the former lagoon area with the installation of additional DNAPL recovery wells, as well as a proposed slurry wall / groundwater collection trench along the southern and eastern perimeters of the DNAPL Source Area. Detrex understands that the slurry wall will likely require the development of an Explanation of Significant Difference (ESD) document. However, based on discussions with the USEPA, Detrex is in agreement with outlining a proposed conceptual installation of a slurry wall pending the completion of the proposed MIP investigation, DNAPL recovery well installations, and completion of the ESD document. Further details are presented in the remainder of the Work Plan, documented herein. Detrex provided a proposed schedule of activities to USEPA in August 2011. A copy is provided in **Appendix B**.

## 1.2 OBJECTIVES

The objective of the additional DNAPL recovery wells is to provide for enhanced collection of DNAPL associated with the former lagoon area of the Site. Detrex considers that the addition of a

series of DNAPL recovery wells will effectively surround the former lagoon area (i.e., DNAPL source area) to the north and west and allow for the enhanced recovery of any potentially mobile DNAPL in the subsurface. Because the existing DNAPL recovery system is labor intensive and DNAPL recovery volumes have historically decreased, the system enhancements are designed to minimize or eliminate the operation and maintenance issues associated with the existing DNAPL recovery system such as deterioration of piping, well screen malfunctions, and HSSE issues related to contact with DNAPL.

Additionally, Detrex is proposing to complete a MIP investigation in the northern portion of the Site extending comprised of approximately 40 boring locations to further define any potential subsurface impacts from the DNAPL Source Area, as well as to provide additional data needed to evaluate the locations of the proposed slurry wall.

In order to meet this objective, the Work Plan provides the following information:

- Overview of existing DNAPL recovery system and associated maintenance issues;
- Description of the additional DNAPL recovery well design;
- Locations of additional DNAPL recovery wells;
- Description of the MIP Investigation;
- Preliminary conceptual design of the proposed additional slurry wall / groundwater collection trench;
- Soils Management Plan for DNAPL impacted soils which may be encountered during field activities;
- Schedule for implementation; and
- HASP considerations.

## 1.3 WORK PLAN OUTLINE

The Work Plan, documented herein, is broken down into the following sections:

- **Section 1.0** – Introduction
- **Section 2.0** – DNAPL Recovery System Overview
- **Section 3.0** – Additional DNAPL Recovery Scope of Work
- **Section 4.0** – Operation & Maintenance / Performance Monitoring
- **Section 5.0** – MIP Investigation
- **Section 6.0** – Health & Safety Program
- **Section 7.0** – Schedule

This section provides an overview of the existing DNAPL recovery system, including O&M issues, as well as an overview of the proposed enhancements to the DNAPL recovery system. Details are provided in the following sections.

## 2.1 OVERVIEW OF EXISTING DNAPL RECOVERY SYSTEMS

The existing (pilot) DNAPL recovery system consists of a performance-scale, vacuum-enhanced DNAPL recovery system installed to remove readily recoverable DNAPL from the subsurface. Twelve (12) recovery wells (RW-1 through RW-12) were originally installed as a part of the DNAPL recovery pilot study. **Figure 2-1** depicts the location of the existing DNAPL recovery system. Additional enhancement to the DNAPL recovery system was completed in 2007 with the installation of two (2) DNAPL recovery wells (RW-13 and RW-14). To-date, the DNAPL recovery system has recovered an estimated 16,000 gallons of DNAPL from the subsurface since operations began in 2002. Since the original system was designed as a pilot system, it has been the intention of Detrex to enhance and optimize the operation of the system based on observed conditions at the Site. Concurrently, Detrex has also installed a number of other remedial measures at the Site (i.e., eastern slurry wall, eastern groundwater collection trench, and southern groundwater interceptor trench) to mitigate the potential impacts of DNAPL from the former lagoon (i.e., source) area.

The original DNAPL recovery system was designed to operate continuously, although not all components of the system may have operated at a given time, based on site conditions. Key design considerations included the density of the DNAPL (specific gravity-1.5), the low permeability of the subsurface materials, and the incompatibility of the DNAPL constituents with certain common construction materials, such as poly vinyl chloride (PVC).

Previously completed work activities associated with the DNAPL recovery system include the following:

- DNAPL Recovery Well Drilling and Installation - Completion of 12, stainless steel, Phase I DNAPL recovery well installations along the northern border of Detrex property and running north-south from the northern boundary of Detrex property (see **Figure 2-1**).
- DNAPL System Monitoring Wells - Completion of three (3), stainless steel, Phase I DNAPL monitoring wells in the vicinity of the recovery wells for monitoring of groundwater levels and DNAPL thickness. Following the initial monitoring well installations, four (4) supplementary new monitoring wells were installed proximal to the DNAPL recovery wells to monitor DNAPL recovery.
- Equipment Building Installation - Installation of the equipment building, including but not limited to the foundation and floor slab, all specified plumbing, pumping stations, valves and manifolds, blowers, filters, DNAPL/water separator, DNAPL holding tank, and granular activated carbon treatment vessels.
- Satellite Pump House Installation - Installation of two (2) satellite pump houses, including but not limited to, all specified plumbing, pumps, valves, and manifolds.

- Plumbing and Hardware Connections - Installation of piping, braces and supports to connect the system together as described in previously submitted documentation, addenda, or written and approved changes or modifications.
- Power Supply - Installation of a power supply adequate to operate and maintain all components of the system.
- Logic Controllers – Installation of programmable logic controllers for the operation of the DNAPL recovery system components.
- Additional DNAPL Recovery Wells – Completion of two (2) stainless steel recovery wells installed using sonic drilling techniques with a larger borehole size and modified screen slot sizes. In addition, different DNAPL recovery pumps were installed.

## 2.2 OVERVIEW OF OPERATION AND MAINTENANCE ISSUES

Since installation of the pilot DNAPL recovery system was completed in October 2002, a significant quantity of DNAPL has been recovered. However, not all system components have historically functioned as anticipated, resulting in a high level of maintenance. Between October 2002 and September 2003, four wells were capped and taken off-line due to short-circuiting of injected air (RW-2 and RW-11) or excessive sediment production (RW-4 and RW-10). Silting within the original DNAPL recovery wells has been problematic since the startup of the system.

During Fall 2003 and Winter 2004, Detrex made several improvements to the treatment system, including the following:

- Installation of an approximately 500-gallon vertical stainless steel settling tank with a rounded base to receive the system influent in the treatment building. The existing DNAPL/water separator was removed;
- Replacement of the existing pump houses with 8'x 8' x 8' wood-framed buildings with heating, insulation, lighting and ventilation. The existing recovery pumps and vacuum boxes were re-used, and the manifolds were rebuilt and equipped with pneumatically actuated solenoid valves;
- Replacement of existing HDPE piping (tubing) with stainless steel piping due to sagging between supports and concerns that low spots may freeze. Detrex also replaced the HDPE drop tubes with stainless steel drop tubes;
- Redevelopment and sediment removal from all existing DNAPL recovery wells; and
- Installation of sleeves in two existing wells to assess the effectiveness of reducing available screen length in reducing short-circuiting.

Although the screens and casing of all recovery wells remain intact, select wells remain off-line due to short-circuiting or excessive silt production or DNAPL crystallization, despite the system improvements. In addition, it is anticipated that the wells will likely require increased pressure over time to pump DNAPL, which will further exacerbate problems with short-circuiting. Based

on a review of operational data as well as the ongoing maintenance issues with silt production, Detrex installed two (2) additional DNAPL recovery wells in 2007 to attempt to address the previously observed problems associated with DNAPL recovery at the Site. Rotosonic drilling techniques were used to minimize smearing of the boreholes. The following changes to the existing well design and recovery system were as follows:

- To reduce or eliminate excess silt build-up including DNAPL crystals in the well, the borehole diameter was increased to approximately 12-inches, and the screen size was decreased from 0.020 to 0.010 inches. In addition, the grain size of the well sand pack was reduced to allow less than 5% of the sand pack to pass through the screen.
- To avoid short-circuiting, the pumping system design was modified to eliminate the introduction of air into the recovery well screen.

The alternative recovery well design was implemented with the install of DNAPL recovery wells RW-13 and RW-14. Following installation, the DNAPL recovery wells were placed into operation. However, the re-designed DNAPL recovery wells continued to exhibit silting, as well as operations and maintenance issues, and low DNAPL recovery rates persisted. As a result, Detrex has again re-evaluated the DNAPL recovery system and is proposing further enhancements to the system designed to address noted operational issues. The proposed enhancements to the existing DNAPL recovery system are presented briefly in Section 2.3, and further details are provided in Section 3.0.

## 2.3 PROPOSED ADDITIONAL DNAPL RECOVERY SYSTEM COMPONENTS

Based on a request by USEPA in March 2011, Detrex has re-evaluated the historical operation of the existing DNAPL recovery system and is proposing to further enhance DNAPL recovery with the installation of additional DNAPL recovery wells. As indicated previously the enhancements will be focus on the northern perimeter of the former lagoon area (i.e., DNAPL source area) with a combination of additional vertical recovery wells and the use of a mobile DNAPL recovery unit (MDRU). The following sections provide a brief overview of the proposed enhancement.

### 2.3.1 Proposed Additional DNAPL Recovery Wells

Additional vertical DNAPL recovery wells are proposed along the northern property boundary of the Site in order to enhance the recovery of DNAPL in this area. Eighteen (18) recovery wells will be installed on approximately 40-foot centers. The locations of the proposed recovery wells are based on historical information, including results from the Sediment and DNAPL Delineation Report (URS, 2010). The tentative locations of the supplemental DNAPL recovery wells are depicted graphically in **Figure 2-2**.

The supplemental DNAPL recovery wells will be installed from ground surface through the lacustrine clay into the top of the underlying glacial till. Rotosonic drilling techniques will be used after all new recovery wells. The wells will be screened over the bottom ten (10) feet of the lacustrine clay with an approximate two (2) foot sump extending into the glacial till to

provide for DNAPL collection. Total well depths are anticipated in the range of 25 to 30 feet below ground surface (ft-bgs). Stainless steel material will be used for both the well casing and screen. A cross section along the northern property boundary of the Site depicting the anticipated depths of the proposed supplemental DNAPL recovery wells is shown in **Figure 2-3**.

### 2.3.2 Proposed Mobile DNAPL Recovery Unit (MDRU)

As part of the proposed enhanced DNAPL recovery, Detrex is presently designing a Mobile DNAPL Recovery Unit (MDRU), which will be utilized to apply a focused and intermittent vacuum on each of the newly installed DNAPL recovery wells. Following the vacuum enhancement application, each of the DNAPL recovery wells will then be placed into a DNAPL recovery mode for product removal at each of the individual wells. Additional details are provided in Section 3.2. Based on the performance of the MDRU using the new recovery wells, a program for application with all recovery wells will be developed.

### 2.3.3 Conceptual Design of Proposed Slurry Wall

To further supplement the ongoing and additional DNAPL recovery, a slurry wall component to source area remedial action is in the conceptual design phase. A slurry wall along with an upgradient groundwater collection trench was previously installed along the western and northwestern corner of the Site as part of the existing approved site-wide remedy (see **Figures 2-1 & 2-2**). The incorporation of an additional length of slurry wall connecting the existing slurry wall with the new segment would be effective in completely isolating the area of ongoing DNAPL recovery, and Detrex believes this to be consistent with the existing Detrex Source Area Record of Decision (ROD). The additional slurry wall segment would extend from the existing southernmost point of the existing slurry wall to the south, then west to east across the Detrex Site (i.e., south of the former Lagoon Area), and then back to the north along the eastern property boundary to intersect with the new DNAPL recovery wells. As with the existing slurry wall, the installation of a groundwater collection trench located upgradient of the slurry is also included as a component of the conceptual design.

The conceptual design for the proposed slurry wall would be a wall of approximately 1,900 lineal feet with a nominal depth of approximately 30 ft-bgs. The nominal depth of the slurry wall would extend through both the Lacustrine Clay and Glacial Till units. The bottom of the slurry wall will be positioned so that it is below the elevation of the Fields Brook channel. The groundwater collection trench would be of similar length and equipped with two sumps, located at the approximate midpoint of the trench, to facilitate the removal of collected groundwater from the trench. The groundwater collection trench would be installed through the Lacustrine Clay, and subsequently keyed into the underlying Glacial Till. Based on the performance of the existing groundwater interceptor trench, Located further to the south on the Detrex Site, the slurry wall groundwater collection trench would be expected to collect approximately 2 gallons per minute or less. The primary focus of the groundwater collection trench operation would be to reduce the buildup of groundwater upgradient of the slurry wall and to eliminate the hydraulic driving force for any potential DNPAL migration. The proposed slurry wall conceptual design is presented graphically in **Figure 2-4**. The final location of the

slurry wall will be further evaluated based on the completion of the planned membrane interface probe (MIP) investigation, which is described in Section 5.0.

Based on discussions with the agency, Detrex understands that an Explanation of Significant Difference (ESD) would likely be necessary prior to the installation of the proposed slurry wall. It should be noted, however, that the use of a slurry wall does fall within the approved ROD, and the enhanced recovery of DNAPL will still be ongoing with thirty-two (32) recovery wells installed, following the completion of the proposed eighteen new DNAPL recovery wells. Additionally, the operation of the groundwater collection trench in conjunction with the slurry wall, and the subsequent reduction in hydraulic gradient, may also have the added effect of enhancing DNAPL recovery within the new and existing DNAPL recovery wells because of the resulting gradient reversal. The proposed use of a longer slurry wall was one of the potential remedial alternatives previously evaluated, and based on the historical operational difficulties of the DNAPL recovery system, is warranted for re-consideration.

Numerous investigations over the past several years have not identified the presence of any DNAPL extending significantly outside of the area of the former lagoons. These results coupled with the results from the proposed MIP investigation should provide conclusive data as to the nature and extent of the DNAPL in the subsurface. Presently, all of the data indicates that the DNAPL, while present in the subsurface, is not migrating due to the nature of the geologic and hydrogeologic conditions at the Site. Based on the comprehensive evaluation of site conditions, existing data, additional voluntary remedial measures (i.e., southern groundwater interceptor trench), and previous consideration as a potential remedial alternative, Detrex believes that the incorporation of an extended slurry wall will provide for the overriding remedial action objective of protecting Fields Brooks from potential future impacts from DNAPL. Therefore, the preparation and approval of an ESD from the USEPA is requested and Detrex will work with the agency to provide the data necessary to complete this effort.

This section provides additional details related to the proposed Scope of Work (SOW) related to the installation of supplemental DNAPL recovery wells near the former lagoon area (i.e., DNAPL source area), the design of the Mobile DNAPL Recovery Unit (MDRU), as well as details related to the management of DNAPL-impacted soils, operations & maintenance modifications, and development of a project completion report.

## 3.1 ADDITIONAL DNAPL RECOVERY WELLS

The following section present details related to the design and installation of the supplemental DNAPL recovery wells that are part of this SOW.

### 3.1.1 DNAPL Recovery Well System Design

The intent of the supplemental DNAPL recovery well design is to:

1) Provide additional locations where potentially mobile DNAPL can be removed from the subsurface;
2) Limit O&M issues related to silt and crystallized DNAPL entering the wells;
3) Provide a line of recovery along the northern property boundary of the Site; and
4) Work in conjunction with the existing DNAPL recovery system.

Eighteen (18) new DNAPL recovery wells will be installed in 12-inch diameter boreholes. The boreholes will be advanced using Rotosonic drilling techniques. Rotosonic drilling uses a combination of rotary motion and oscillation. During this process, the drill bit is vibrated up and down while also being pushed down and rotated. This creates a high frequency force that in overburden causes the soil particles to fluidize. Spoils are moved using water or compressed air. The primary advantage of the rotosonic technique is reduction of smearing of the subsurface as the borehole is completed and the reduction in the volume of spoils created.

At a minimum, the borings will extend to the contact between the Lacustrine Clay and Glacial Till units, which is expected to be encountered at approximately 25 to 30 ft-bgs based on existing recovery well construction and geologic conditions in the area. The actual depth will be determined in the field based on conditions encountered. Boring logs will be prepared for each location and will include the following information:

- A description of geologic materials and the depth at which encountered;
- Static water level;
- Boring termination depth;
- A description of problems and corrective measures;
- The depth and diameter of the temporary casing; and
- Well construction details.

Well casing materials will be 3.0-inch diameter, type 304 flush threaded stainless steel pipe. Well screens will be 3.0-inch diameter continuous wrapped stainless steel with 0.010-inch slots. Screen length will be approximately 10 feet. The filter pack will consist of poorly graded fine (USCS) sand with less than 5 percent passing a #8 standard sieve opening. The filter pack will extend approximately 2 to 4 feet above the top of the screen. The proposed design for the additional DNAPL recovery wells is similar to the wells installed in 2007. The proposed borehole diameter, slot size, and filter pack material gradation is believed to be appropriate based on previous grain size analyses. Also a two-foot sump will be extended into the glacial till to provide for DNAPL collection. Since the proposed recovery wells will be operated as DNAPL collection points without the use of continuous pumping or vacuum, it is believed that the previously encountered silting issues will be minimized and the proposed design will be effective for the collection of DNAPL within the borehole. The actual screen length and slot sizes may be altered in the field if significantly different conditions are encountered. Any changes to the design will be documented in the Project Completion Report. Proposed well construction details are presented in **Figure 3-1**.

### 3.1.2 Proposed DNAPL Recovery Well Locations

In order to further enhance the recovery of potentially mobile DNAPL the new recovery wells are proposed for installation in the general vicinity of the northern property boundary of the Site (see **Figure 2-2**). Based on historical data, DNAPL has been noted in borings completed in these areas. The exact locations will be determined based on field conditions and the presence of above or below ground piping, lines, etc… The overall intent of the supplemental DNAPL recovery wells is to provide additional DNAPL recovery locations along the northern property boundary in conjunction with the existing DNAPL recovery system. Additionally, the locations of the supplemental recovery wells will be surveyed for horizontal and vertical control.

### 3.1.3 Decontamination and Disposal Equipment and Soil Cuttings

All drilling equipment including any rotosonic equipment, split-spoons or other tools that are exposed to subsurface materials will be decontaminated with a high-pressure steam-cleaning unit followed by three rinses. All decontamination water will be collected in a portable decontamination unit and the liquid will be disposed of through the existing DNAPL recovery and treatment system.

Soils generated as part of the recovery well installations will be combined and managed on-site within the former lagoon area as part of the DNAPL Soils Management Plan (see Section 3.3).

### 3.1.4 Recovery Well Development

Following installation of the new recovery wells, they will be developed by the drilling contractor and Detrex personnel by surging and by removing up to 10 well volumes of liquid. During development the liquid will visually inspected for turbidity. All purge water will be disposed of through the existing DNAPL Recovery and Treatment System.

All soil cuttings removed from the boreholes will be stockpiled within the footprint of the former lagoon area and temporarily with plastic sheeting. Following the drilling and completion of the DNAPL recovery wells, all of the generated soils will be placed / managed in-place within the former lagoon, and permanently covered. The generated soils will be managed following the methods outlined in the DNAPL Soils Management Plan (see Section 3.3. URS, URS' drilling subcontractor, and Detrex personnel will work in concert to coordinate the temporary storage and placement of the soil cuttings from the recovery well installations.

### 3.1.5 Incorporation into Existing DNAPL Recovery System

Upon completion of drilling and well installation, the new recovery wells will be fitted with stainless steel drop tubes and sealed wellheads to facilitate the individual vacuum application and collection of accumulated DNAPL. No dedicated pumps are being proposed for the new recovery wells, instead Detrex personnel will individually apply vacuum to each of the new DNAPL recovery wells on a rotating schedule, monitor DNAPL accumulation, and complete DNAPL collection events on a rotating schedule based on the accumulation of recoverable DNAPL in the individual wells. The monitoring and removal of DNAPL from the new recovery wells will be further detailed in the revised OM&M Plan.

## 3.2 MOBILE DNAPL RECOVERY UNIT (MDRU)

The following section present details related to the preliminary design and proposed operation of the Mobile DNAPL Recovery Unit (MDRU) that is part of this SOW.

### 3.2.1 MDRU Preliminary Design

Detrex personnel are presently working on the design and construction of an MDRU for use in conjunction with the new DNAPL recovery wells being installed as part of the proposed SOW. The preliminary design for the MDRU is currently underway and consists of the following components:

- Vacuum pump with quick connect capabilities to attach to individual DNAPL recovery wells;
- Water vapor knockout tank and vapor phase carbon treatment for extracted vapors;
- Pumps for the removal of collected DNAPL and/or groundwater;
- DNAPL and groundwater collection tanks;
- Generator to supply power to the MDRU; and
- Towable trailer to provide for the movement of the MDRU between individual DNAPL recovery wells.

The MDRU will be towed between DNAPL recovery wells using Detrex personnel and equipment. **Figure 3-2** provides a process flow schematic related to the preliminary design of the MDRU.

### 3.2.2 MDRU Operations

The intent of the MDRU is to provide Detrex with the ability to focus vacuum enhancement on individual DNAPL recovery wells for short periods, on a regular schedule, to effectively pulse the saturated zones in order to enhance the accumulation of DNAPL in the recovery well. The schedule for applying vacuum to each of the DNAPL recovery wells will be developed following the installation and preliminary testing of the new DNAPL recovery wells and the MDRU. Additionally, the MDRU will be equipped with vapor phase carbon in order to treat recovered organic vapors generated during the vacuum application.

Following the vacuum enhancement events and the accumulation of DNAPL, the individual wells will be pumped to recover DNAPL from the well. All recovered DNAPL will be containerized on the MDRU and properly disposed of by Detrex personnel. Any produced water from the DNAPL recovery events will also be containerized on the MDRU and processed through the Detrex treatment plant.

As indicated earlier, the MDRU will be constructed on a towable trailer such that it can easily be moved between the individual DNAPL recovery wells by on-site personnel. The existing O&M plan will be updated to provide detailed information related to the operation of the MDRU, once the appropriate procedures have been evaluated and finalized.

## 3.3 DNAPL AREA SOILS MANAGEMENT

As described in the USEPA letter dated March 28, 2011, the agency has determined that generated soils from activities related to Source Control remediation efforts may remain on-site within the impacted area (i.e., former lagoon area). USEPA provided several provisions to Detrex if impacted soils are generated during field activities. These provisions included the following:

- There needs to be an affirmative determination that the material is remediation waste.
- The waste material must be kept within the area of contamination.
- The waste material must be controlled so as to pose no risk of migration.

Upon receipt of the March 28, 2011 letter, Detrex notified USEPA that it intends to utilize a DNAPL Soils Management Area within the historical footprint of the former lagoons.

In order to comply with the requirements specified by the USEPA for on-site soil management, Detrex will prepare an area within the footprint of the former lagoon area for use subsequent use as a soils management area. **Figure 3-3** provides the approximate location of the proposed area within the former lagoon boundaries. The area proposed for soils management has been previously backfilled with soil following the closure of the former lagoons in the mid-1970s. The area is currently mounded and sloped radially. An approximate 75 ft x 75 ft area will be designated as the DNAPL Soils Management Area. The area will be excavated to a depth of approximately 1.5 ft-bgs and the surficial soils will be utilized to create a soil berm surrounding the excavation in order to isolate the materials generated from the recovery well and recovery

trench installation activities. All generated soils will then be placed within the limits of the berm. Materials placed within the berm will be minimally compacted and graded.

Upon completion of the field installation activities and placement of the generated soils, the DNAPL Soils Management area will be covered with a 40-mil geomembrane and geotextile fabric in order to limit surface water coming into contact with the soils. The geomembrane and geotextile will then be covered with a layer of approximately 6 inches of #57 stone in order to cover the liner and further stabilize the material. A schematic cross section of the conceptual design is presented as **Figure 3-4**.

## 3.4 OPERATION & MAINTENANCE ADDENDUM

Upon completion of the additional recovery wells, Detrex will initially monitor the DNAPL recovery wells for potentially mobile DNAPL in order to determine the quantities and rates of any DNAPL accumulation. After the completion of the preliminary testing, the MDRU will also be tested in order to determine vacuum application and DNAPL recovery schedules. This initial monitoring will be reported to the USEPA in a brief Technical Memorandum to be submitted within 60 days of the systems being placed into operation. Based on performance of the MDRU in the new recovery wells, a program for application with all new and existing functional recovery wells will be developed.

Once initial data evaluation is completed, Detrex will prepare an Addendum to the existing Operation, Maintenance and Monitoring (OM&M) Plan, which will document the ongoing evaluation and operations of the supplemental DNAPL recovery wells and the MDRU. Submittal of the OM&M Plan Addendum to the USEPA will be within 90 days of the system being placed into operation.

## 3.5 PROJECT COMPLETION REPORT

Within 90 days of the completion of all fieldwork, Detrex will prepare and submit to the USEPA a Project Completion Report. This report will contain, but not be limited to the following items:

- Introduction
- Methodologies
- Deviations from the Work Plan
- Data Summary (including, boring logs, survey information, etc…)
- As-built Drawings
- Discussion of Field Observations
- Summary and Conclusions

Only a final version of the Project Completion Report is anticipated for documentation purposes. Ongoing documentation related to the operation of the supplemental recovery wells and MDRU will be presented along with reporting for the existing DNAPL recovery system.

The existing DNAPL recovery system is operated according to the existing Interim OM&M Plan. The addition of the supplemental DNAPL recovery wells and MDRU will necessitate modifications and revisions to the existing OM&M Plan. Additionally, the new recovery wells and MDRU will also require evaluation, on an ongoing basis, to evaluate the effectiveness of DNAPL recovery in the former lagoon area of the Site. Also application of the MDRU with existing recovery wells will be evaluated.

This section briefly outlines the proposed O&M and performance-monitoring program that will be implemented once the new systems become operational.

## 4.1 SUPPLEMENTAL DNAPL RECOVERY WELLS

The design of the supplemental DNAPL recovery wells is to facilitate the recovery of DNAPL from the wells in essentially a manual operation mode, with the aid of the MDRU. As DNAPL potentially accumulates in the wells, Detrex personnel will remove the free product on an as-needed basis. Any recovered DNAPL will be quantified volumetrically and added to the existing DNAPL recovery and treatment system for subsequent handling / processing by Detrex.

Evaluation of the DNAPL recovery wells will take place in phases. The following section briefly outlines the various anticipated phases.

### 4.1.1 Initial DNAPL Recovery Well Testing

Following the installation and development of the supplemental DNAPL recovery wells, DNAPL recovery testing will be completed to evaluate the potential for DNAPL to accumulate in the individual recovery wells. The general procedure is outlined below:

1) Allow water level to stabilize along with DNAPL level (if present);
2) Once levels have stabilized, take baseline levels and evacuate DNAPL from recovery well;
3) Monitor recovery of DNAPL over time in well until recovery approaches original levels;
4) Develop DNAPL recovery curves for each of the wells; and
5) DNAPL recovery intervals will then be estimated based on the observed rates.

Once the initial testing has been completed, DNAPL recovery rates should be periodically re-evaluated based on observed DNAPL recovery in order to assess the overall effectiveness of ongoing DNAPL recovery efforts. The general procedure outlined above should be utilized as part of each re-evaluation.

### 4.1.2 DNAPL Recovery Well Performance Monitoring

Each of the 3-inch recovery wells should be equipped with a dedicated stainless steel drop tube (i.e., nominal 1-inch diameter) to facilitate to recovery of product from the well. Recovered DNAPL volumes should tracked over time to provide information pertinent to evaluating overall

DNAPL recovery. The following data gathering efforts are recommended as part of ongoing performance monitoring:

- Bi-weekly DNAPL and water level gauging in each recovery well;
- Bi-weekly DNAPL and water level gauging in existing monitoring wells located proximal to any of the supplemental DNAPL recovery wells;
- Determination of recovered DNAPL volumes from each recovery well at each removal event;
- Graphing of DNAPL recovery per event and cumulative DNAPL recovery from each recovery well;
- Periodic re-evaluation of DNAPL removal schedule (see Section 4.1.1); and
- Periodic gauging of total well depths to evaluate siltation within the wells, as well as recovery well re-development as warranted.

The bi-weekly monitoring events will likely be adjusted to monthly or quarterly based on the ongoing evaluation of the DNAPL recovery data.

## 4.2 MOBILE DNAPL RECOVERY UNIT (MDRU)

The design of the MDRU is to facilitate the recovery of DNAPL from the individual DNAPL recovery wells. As DNAPL potentially accumulates in the sump, Detrex personnel will remove the free product on an as-needed basis. All recovered DNAPL will be quantified volumetrically and added to the existing DNAPL Recovery and Treatment System for subsequent handling / processing by Detrex.

As was the case for the DNAPL recovery wells, the evaluation of the MDRU will also take place in phases. The following section briefly outlines the various anticipated phases.

### 4.2.1 Initial MDRU Testing

Following the installation and preliminary DNAPL recovery testing of the supplemental DNAPL recovery wells (see Section 4.1.1), DNAPL recovery testing similar to that approach will be initiated to evaluate the operational requirements for MDRU. The general procedure is outlined below:

1) Allow water level to stabilize along with DNAPL level (if present);
2) Once levels have stabilized, take baseline levels and evacuate DNAPL from recovery well sump;
3) Attach vacuum pump from MDRU to wellhead and apply vacuum for established period of time (i.e., 1 – 4 hours), vacuum pressure will also be varied;
4) Monitor vacuum and recovery of DNAPL over time in well until end of vacuum period, and for additional 1- 2 hours following cessation of vacuum;

5) Develop DNAPL recovery curves for the wells with respect to vacuum time and pressure;

6) DNAPL recovery intervals will then be based on the observed rate and a schedule for vacuum application and removing DNAPL from the individual DNAPL recovery wells will then be developed.

Once developed the schedule should be periodically re-evaluated based on observed DNAPL recovery and adjusted accordingly. The general procedure outlined above should also be utilized as part of each re-evaluation.

### 4.2.2 MDRU Performance Monitoring

Following the preliminary testing of the MDRU, each of the individual DNAPL recovery wells will be placed on a regular schedule for vacuum application and DNAPL recovery. Recovered DNAPL volumes and other pertinent data, based on the preliminary testing results, will be tracked over time to provide information pertinent to evaluating overall DNAPL recovery. The following data gathering efforts are recommended as part of ongoing performance monitoring:

- Bi-weekly DNAPL and recovered groundwater volume summaries;
- Bi-weekly DNAPL and recovered water disposal and/or processing summaries;
- Documentation of ongoing preventative O&M for the MDRU;
- Graphing of DNAPL recovery per event and cumulative DNAPL recovery from the recovery wells;
- Periodic re-evaluation of DNAPL removal schedule (see Section 4.2.1); and
- Periodic evaluation of the sump total depth to evaluate siltation within the wells and sump, to evaluate the need for recovery well flushing / re-development as warranted.

The bi-weekly monitoring events will likely be adjusted to monthly or quarterly based on the ongoing evaluation of the DNAPL recovery data.

As part of the proposed SOW, Detrex is proposing to complete additional investigative work in the northern half of the Site using a combination of direct push membrane interface probe (MIP) borings and rotosonic borings. The purpose of the investigation is twofold in nature. First, the MIP borings will be completed across the northern portion of the Detrex Site to further evaluate subsurface conditions with respect to soil and groundwater impacts from chlorinated organics (i.e., DNAPL and dissolved phase). Secondly, the rotosonic borings will be completed along the proposed alignment of the slurry wall and groundwater collection trench to provide geotechnical data necessary for finalizing the design of these components. Details related to each of the planned investigation activities are provided in the following sections.

## 5.1 MEMBRANE INTERFACE PROBE (MIP) INVESTIGATION

The MIP (Membrane Interface Probe) is a multipurpose tool used in soil and groundwater remediation. MIP is a continuous VOC sampling system that heats the soil, water, and vapor matrix as it is driven into the subsurface, mapping contaminants in groundwater and surrounding soil. The VOC mass that is extracted across a permeable membrane is carried to the surface by an inert purge gas via small diameter inert tubing. Once the compounds reach the surface, they are analyzed by a suite of three laboratory grade detectors.

The sensor detection system includes:

- PID (Photo Ionization Detector)
- FID (Flame Ionization Detector)
- ECD (Electron Capture Detector)

These three detectors together offer a range of sensitivities and a means of discriminating different classes of compounds – anything from chlorinated solvents to gasoline hydrocarbons to methane soil gas.

MIP includes an integrated EC (Soil Electrical Conductivity) probe to provide indication of general soil characteristics such as sands, clays, and silts. Using the EC logs, the zones of lower or higher conductivity can be defined, which allows or hinders the movement of contaminants into the subsurface.

The MIP/SC probe is approximately 12-inches (30 cm) in length and 1.5-inches (3.8 cm) in diameter. The probe is driven into the ground at the nominal rate of one foot per minute using a direct push rig. Soil conductivity, the inverse of soil resistivity, is measured using a dipole arrangement. In general, at a given location, lower conductivity values are generally characteristic of larger particles such as sands, while higher conductivities are characteristic of finer sized particles such as silts and clays.

The MIP portion of the probe, developed and patented by Geoprobe Systems, Inc., is based on the principle of heating the soil and/or water around a semi-permeable polymer membrane. The MIP can be used in saturated or unsaturated soils, as water does not pass through the

membrane. Nitrogen is used as an inert carrier gas, and sweeps across the back of the membrane and returns any captured VOCs to the surface.

For the proposed MIP investigation URS intends to subcontract with Columbia Technologies, Inc. (Columbia) located in Baltimore, Maryland. The MIP equipment employed by Columbia utilizes three detectors mounted on a laboratory grade Shimadzu Model 14A gas chromatograph. The output signal from the detectors is captured by a MIP data logging system installed on a MIP Field Computer or laptop computer. Conductivity, speed, detector data and temperature are displayed continuously in real time during each push of the probe.

Immediately upon completion of each location, the dataset is wirelessly delivered to remote servers located in Columbia's headquarters for Quality Assurance/Quality Control (QA/QC) review and upload to a password secure website using Columbia's patented SmartData Solutions® technology. This provides for near real-time evaluation of the field data and thus allows for modification of the investigation approach as data from each MIP location is obtained.

The proposed tentative locations for the MIP borings are presented in **Figure 5-1**, and will be further discussed in Section 5.1.1. Following the completion of each MIP boring the borehole will be sealed from the bottom of the borehole to ground surface with bentonite and/or a bentonite grout mixture.

### 5.1.1 MIP Borings

The first phase of the proposed investigation consists of the installation of up to forty (40) membrane interface probe (MIP) borings. Each of the proposed MIP borings will be completed to a total depth of approximately 30 ft-bgs or until refusal at the Glacial Till / Shale interface is encountered. The proposed MIP locations are designed to characterize the nature and extent of the subsurface impacts within the northern portion of the Detrex Site, as well as to provide data within the former lagoon area where DNAPL is known to be present. The tentative MIP locations are presented in **Figure 5-1**.

For the MIP phase of the investigation, the initial approach for the installation of the MIP borings is as follows:

- Up to forty (40) MIP locations across the northern portion of the Detrex Site extending from the western to eastern sides of the Site. The objectives of the MIP investigation are to further evaluate conditions associated with both the DS Tributary Area of the Site (i.e., northwest corner), and the DNAPL Source Area of the Site (i.e., remaining northern portion). Additionally, some of the MIP locations have been selected to assist in the final alignment of the proposed slurry wall and groundwater collection trench (see **Figure 5-1**).

It should be noted that because the MIP data will be available in essentially real-time, the locations and number of MIP locations may potentially be modified accordingly. As an example, if MIP results indicate that the extent on chlorinated VOC impacts have been delineated then planned boring outside of the delineated area may be eliminated from the investigation plan. Conversely, if the MIP results indicate that additional data may be necessary to more fully characterize a particular area, then additional MIP locations may be added.

MIP locations in the northern portion of the Detrex Site will be designated as MIP-01 through MIP-40, to indicate that the borehole was a MIP location. Any field modifications to MIP investigation will be documented in the field logbook and discussed in the Project Completion Report.

Standard operating procedure for the completion of MIP boring is to obtain readings on approximately one (1) foot interval over the entire length of the boring. This approach is anticipated to be used for the majority of the MIP locations. However, the reading interval may be adjusted to a greater interval spacing if the data from previously completed locations do not exhibit any extraordinary trends or bias. The reduced sample density will not compromise the data evaluation but will facilitate the completion of fieldwork in an expedient manner. This modification will be completed based on the results of the initial MIP borings and consultation between the URS field sampling personnel, Project Manager, agency personnel, and Detrex personnel.

Based on discussion with URS' intended MIP subcontractor, Columbia, it is estimated that the MIP phase of the proposed Work Plan will be completed in approximately ten (10) working days. Additionally, as previously discussed Columbia provides a service known as the SmartData Solutions® technology, which uploads the MIP data from the field to secure servers, and subsequently generates 2-D and 3-D representations of the data as it is collected in the field and then provides a report presenting all findings from the investigation. The data is also available for viewing over a secure network web link.

## 5.2 SOIL BORING INVESTIGATION

The second phase of the proposed investigation will be the collection of depth and location-specific soil samples at locations along the intended alignment of the proposed slurry wall and groundwater collection trench. The locations of the alignment borings will generally correspond with previously completed MIP location to allow for subsequent correlation of pertinent data.

The soil boring will be completed using rotosonic drilling techniques following the completion of the DNAPL recovery wells. Soil sampling will be completed using standard sampling techniques through the drill rods for the collection of soil samples. Soil samples at the selected locations will be obtained using a Shelby tube or similar sampler to provide undisturbed samples for laboratory testing.

The proposed tentative locations for the rotosonic borings are also presented in **Figure 5-1**, and will be further details are discussed in Section 5.2.1. Following the completion of each rotosonic boring the borehole will be sealed from the bottom of the borehole to ground surface with bentonite and/or a bentonite grout mixture.

### 5.2.1 Rotosonic Borings

The second phase of the investigation will consist of up to eight (8) rotosonic boring locations at select locations along the proposed alignment of the slurry wall and groundwater collection trench. Each of the proposed soil borings will be completed to a total depth of approximately 30 ft-bgs or until refusal is encountered at the Glacial Till / Shale bedrock interface. The rotosonic boring locations are generally equally spread along the proposed slurry wall alignment and are designed to supplement the characterization of the geologic conditions along the intended path of the slurry wall. The tentative soil boring locations are also presented in **Figure 5-1**.

The rotosonic soil boring locations will be logged continuously from ground surface to total depth, and the soils will be described in the field by a URS personnel using USCS Soil Classification. Based on field interpretation, the locations and depth intervals for the selected soil samples will be selected and Shelby tube samples will be collected and sent to the laboratory for geotechnical testing. Testing will generally consist of the following:

- Blow counts;
- Moisture content;
- Grain-size distribution;
- Atterburg Limits; and
- Density

All soil samples obtain from the rotosonic soil boring locations will be packaged and shipped to an off-site soil testing laboratory under proper chain of custody forms, using standard turnaround times.

A site specific Health and Safety Plan (HASP) has been previously prepared for drilling and sampling activities at the Detrex Site. An Addendum to the existing HASP will be prepared, as necessary and used for the completion of the slurry wall alignment borings, installation of the supplemental DNAPL recovery wells, construction of the DNAPL Soils Management Area, DNAPL recovery testing, and the operation of the MDRU. During the completion of the fieldwork, it is anticipated that upgrades to Level B may be required. Prior to initiating the fieldwork, specific safety procedures for using Level B equipment will be reviewed by all personnel.

Detrex will provide a copy of the revised HASP to the USEPA prior to the initiation of the field activities outlined in this Scope of Work.

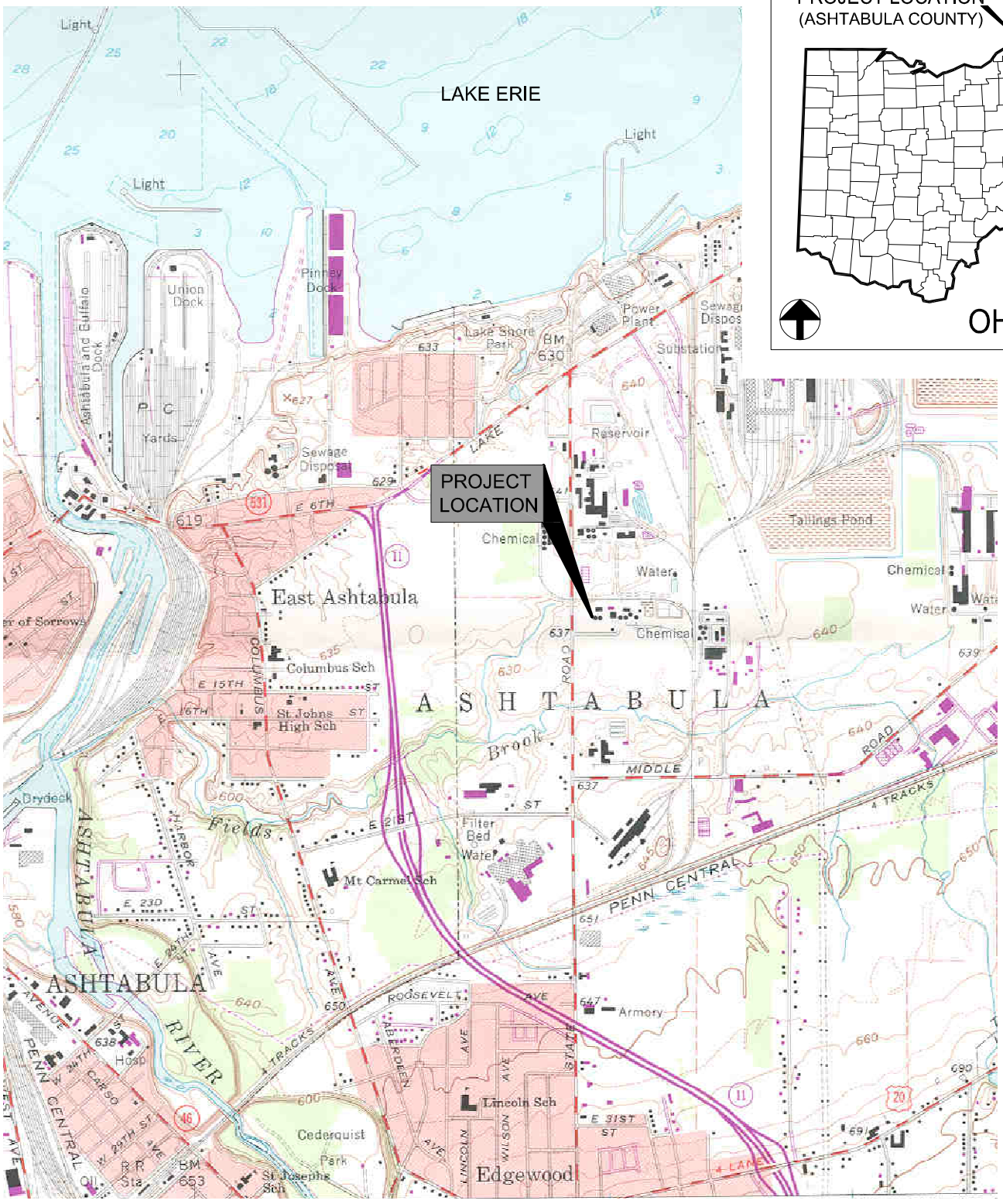
This section provides details related to the proposed schedule for completing the items outline in Section 3.0 (Scope of Work). Detrex is prepared to initiate the Scope of Work, documented herein, upon USEPA approval to proceed. Detrex understands that the slurry wall activities cannot be completed until the ESD has been finalized and issued. However, all other outlined field activities will commence as soon as possible (weather permitting) of notice to proceed depending on subcontractor availability. A generalized schedule was previously submitted to USEPA separately, and is also provided herein as **Appendix B**.

## 7.1 PROPOSED SCHEDULE

The following provides a general overall project schedule:

- **Work Plan Submittal** – September 30, 2011
- **Work Plan Approval / USEPA Notice to Proceed** – October 28, 2011
- **MIP Investigation and Slurry Wall Alignment Borings and Final Design** – November through December 2011
- **Slurry Wall Design Report** – January 23, 2012
- **Supplemental DNAPL Recovery Wells** – March through April 2012
- **DNAPL Recovery Well and MDRU Testing** – March through April 2012
- **Slurry Wall and GW Collection Installation** – April through July 2012
- **Updated Operation, Maintenance and Monitoring (OM&M) Plan** – January through March 2012
  Upon completion of the fieldwork, the existing OM&M Plan will be updated. The update will potentially involve addition of several sections to the existing OM&M Plan. The additions will include:
  - Description of modifications to existing system;
  - Description of supplemental DNAPL recovery well and MDRU operations;
  - Description of long-term operation procedures using the MDRU for recovery of DNAPL in all recovery wells; and
  - Description of any prescribed performance monitoring.
- **Project Completion Report** – November 2012

# FIGURES




UNITED STATES GEOLOGICAL SURVEY
1:24,000 QUADRANGLE
ASHTABULA NORTH, OHIO
1960 PHOTO REVISED 1970
PHOTOINSPECTED 1978

0 1000 2000
SCALE: 1"=2000'

URS

**DETREX CORPORATION**
ASHTABULA, OHIO

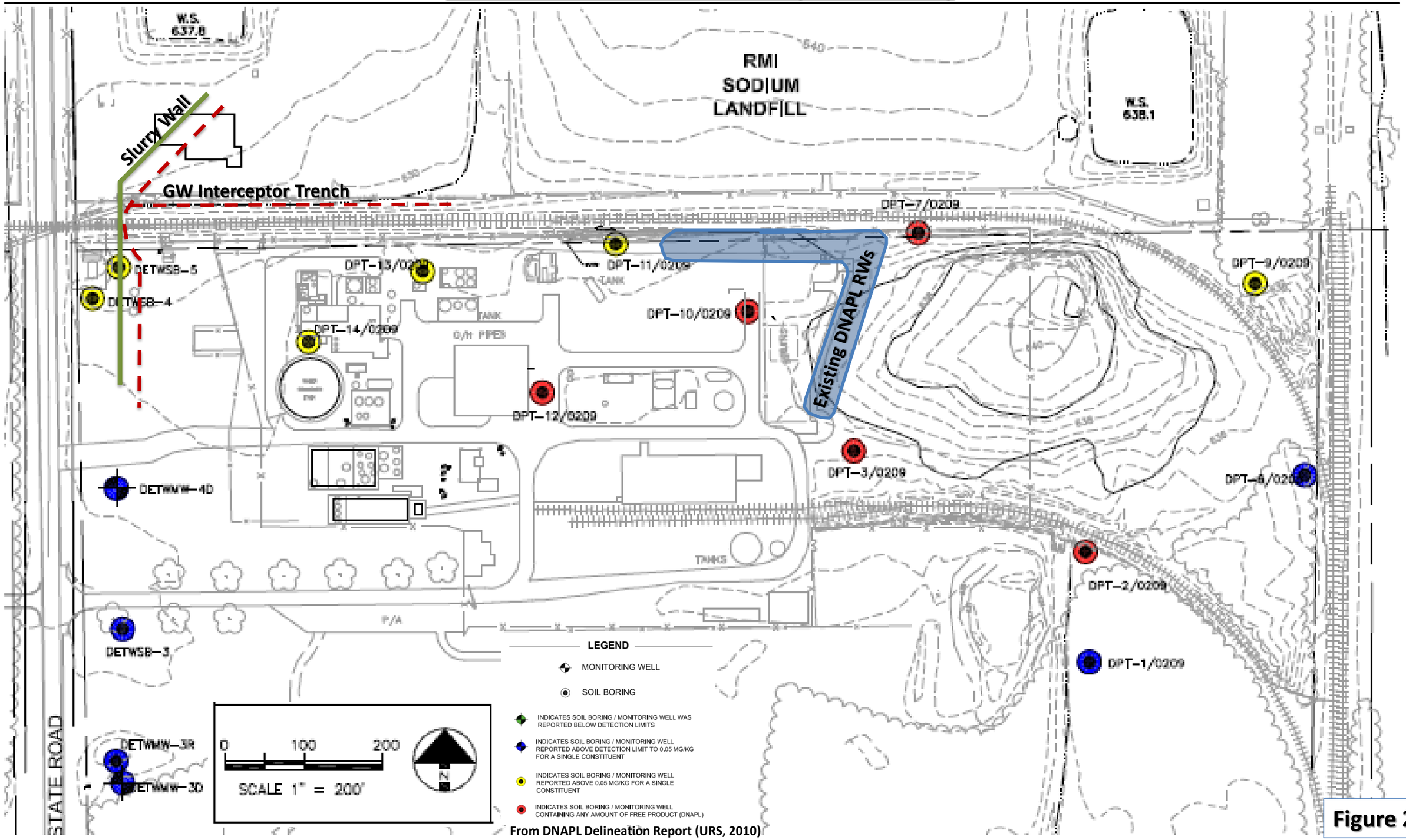
# PROJECT SITE LOCATION MAP

| DRAWN BY: | CHECKED BY: | PROJECT No: | DATE: | FIGURE No: |
|---|---|---|---|---|
| YRC | MLS | 13810732 | 1/18/10 | 1 |

K:\Projects\D\Detrex\13811443\DWGs\Figures\Delineation 2009-2010\Fig-1-GLM.dwg User: anton_heitger Apr 23, 2010 - 6:42pm

# Existing DNAPL Recovery System – Location

## Detrex Site – Ashtabula, OH (Aerial View)

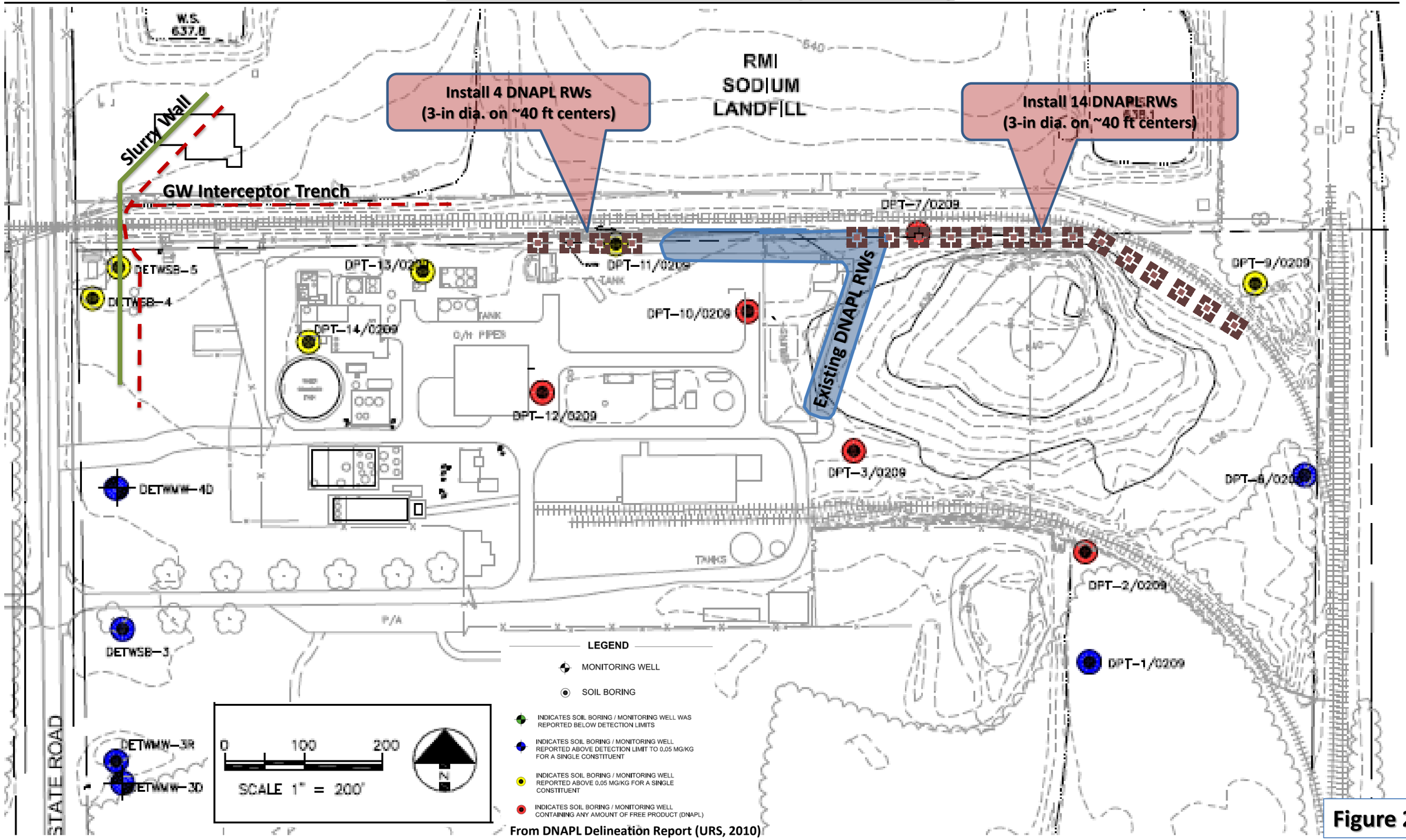



From DNAPL Delineation Report (URS, 2010)

**Figure 2-1**

# Conceptual Design – Additional DNAPL Recovery Wells Schematic

## Detrex Site – Ashtabula, OH (Aerial View)




From DNAPL Delineation Report (URS, 2010)

Figure 2-2

# Conceptual Design – Additional DNAPL Recovery Wells X-Section

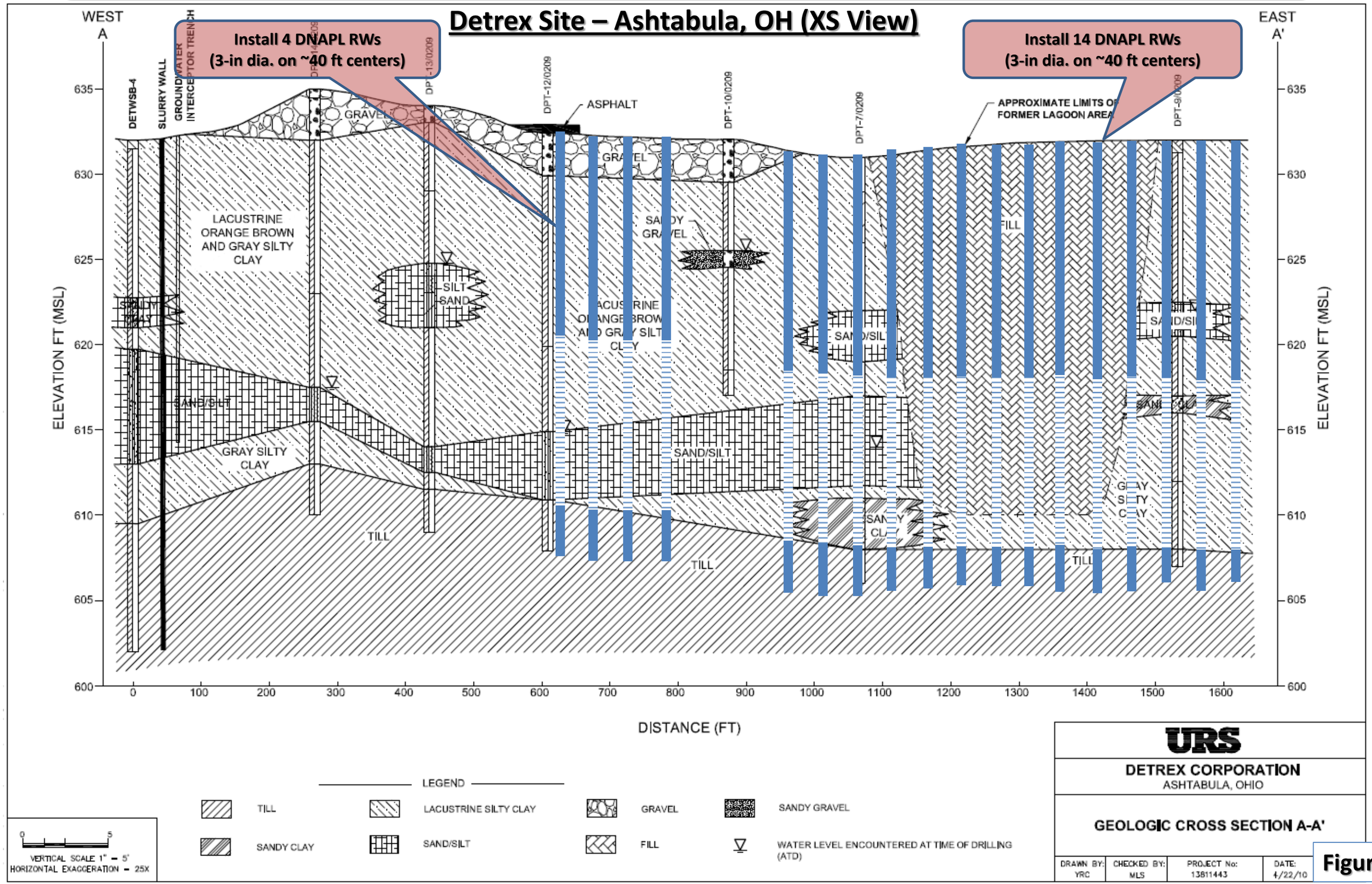
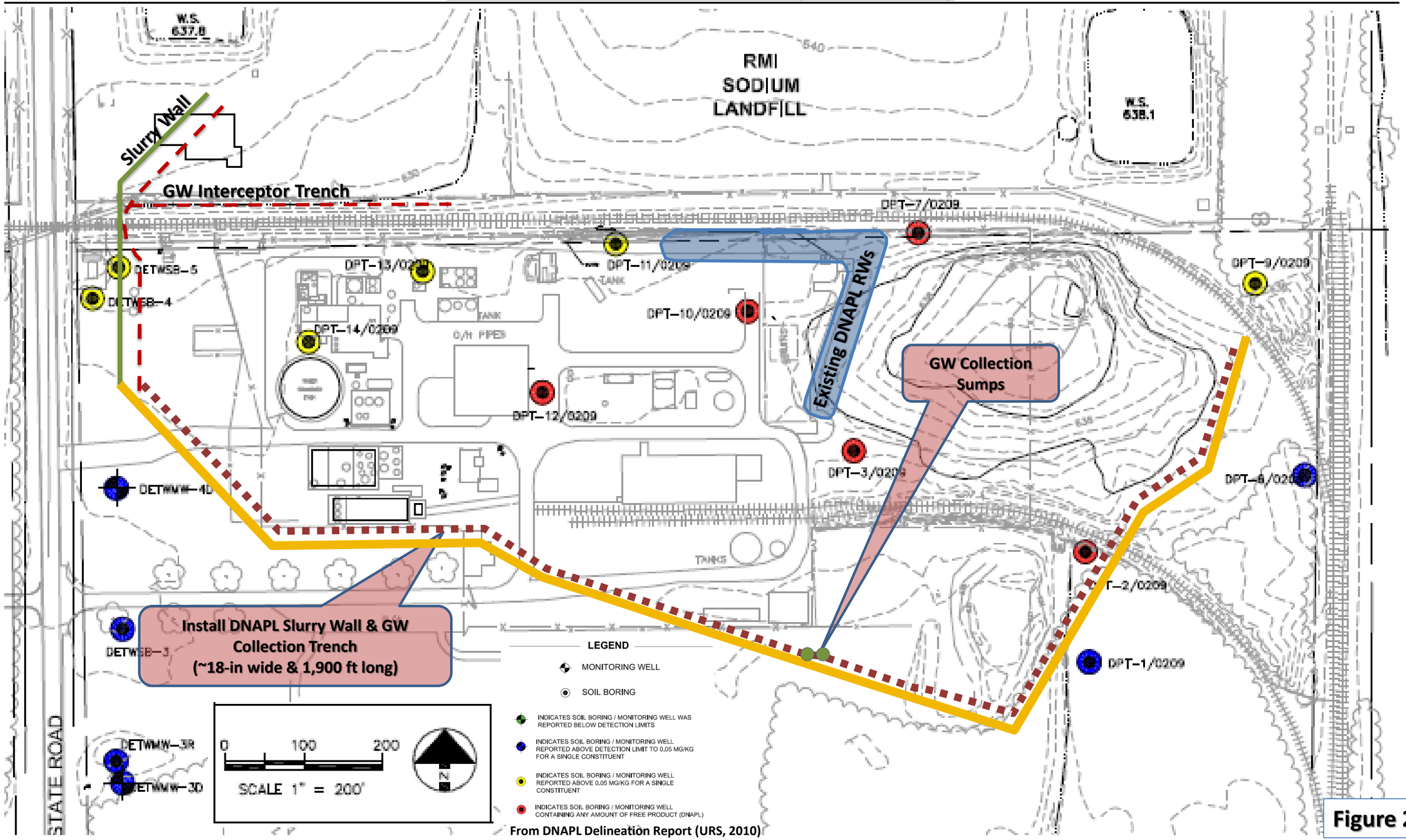



Figure 2-3

# Conceptual Design –DNAPL Slurry Wall & GW Collection Trench Schematic

## Detrex Site – Ashtabula, OH (Aerial View)




From DNAPL Delineation Report (URS, 2010)

Figure 2-4

# Conceptual Design – DNAPL Slurry Wall & GW Collection Trench X-Section

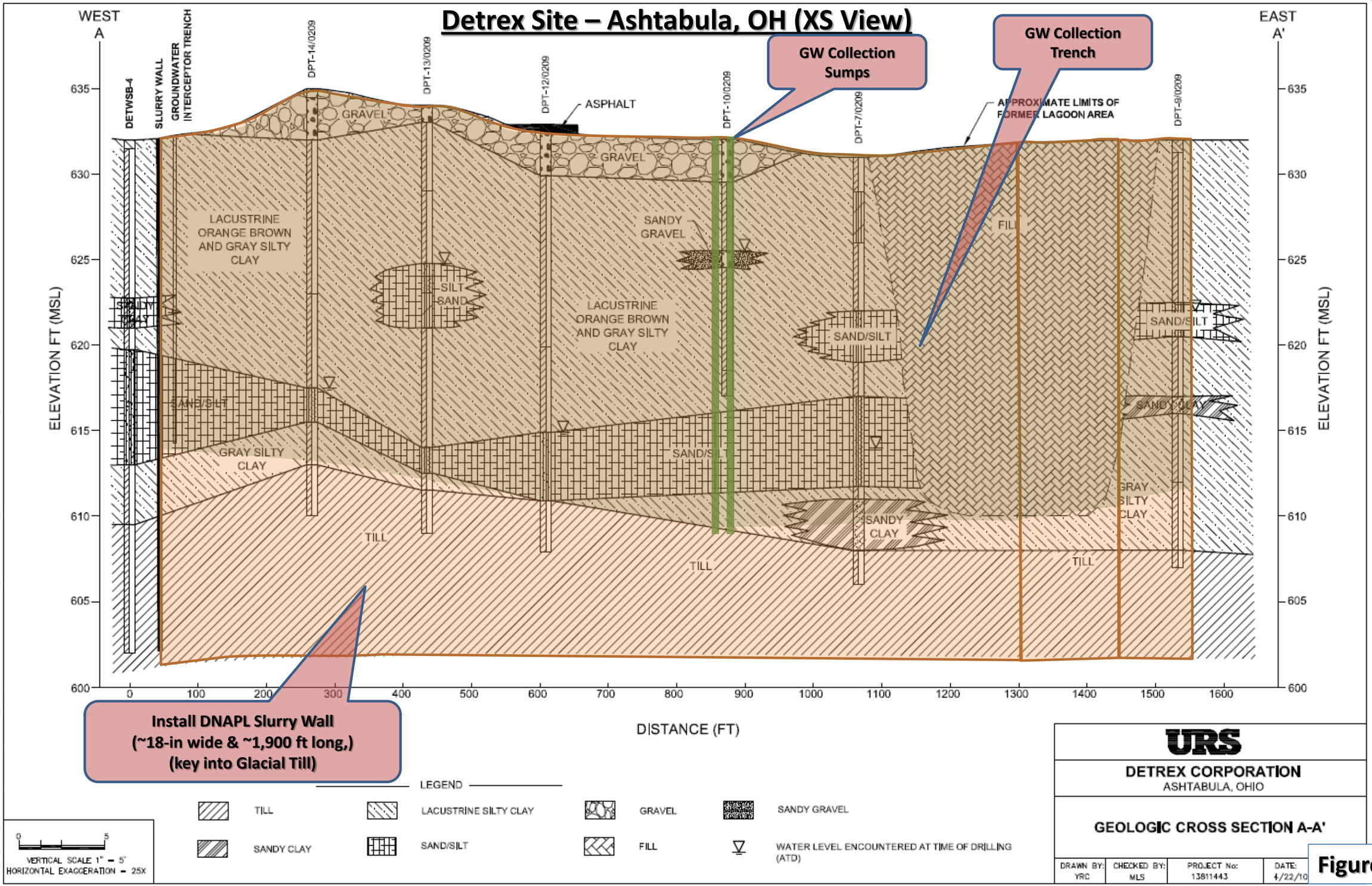
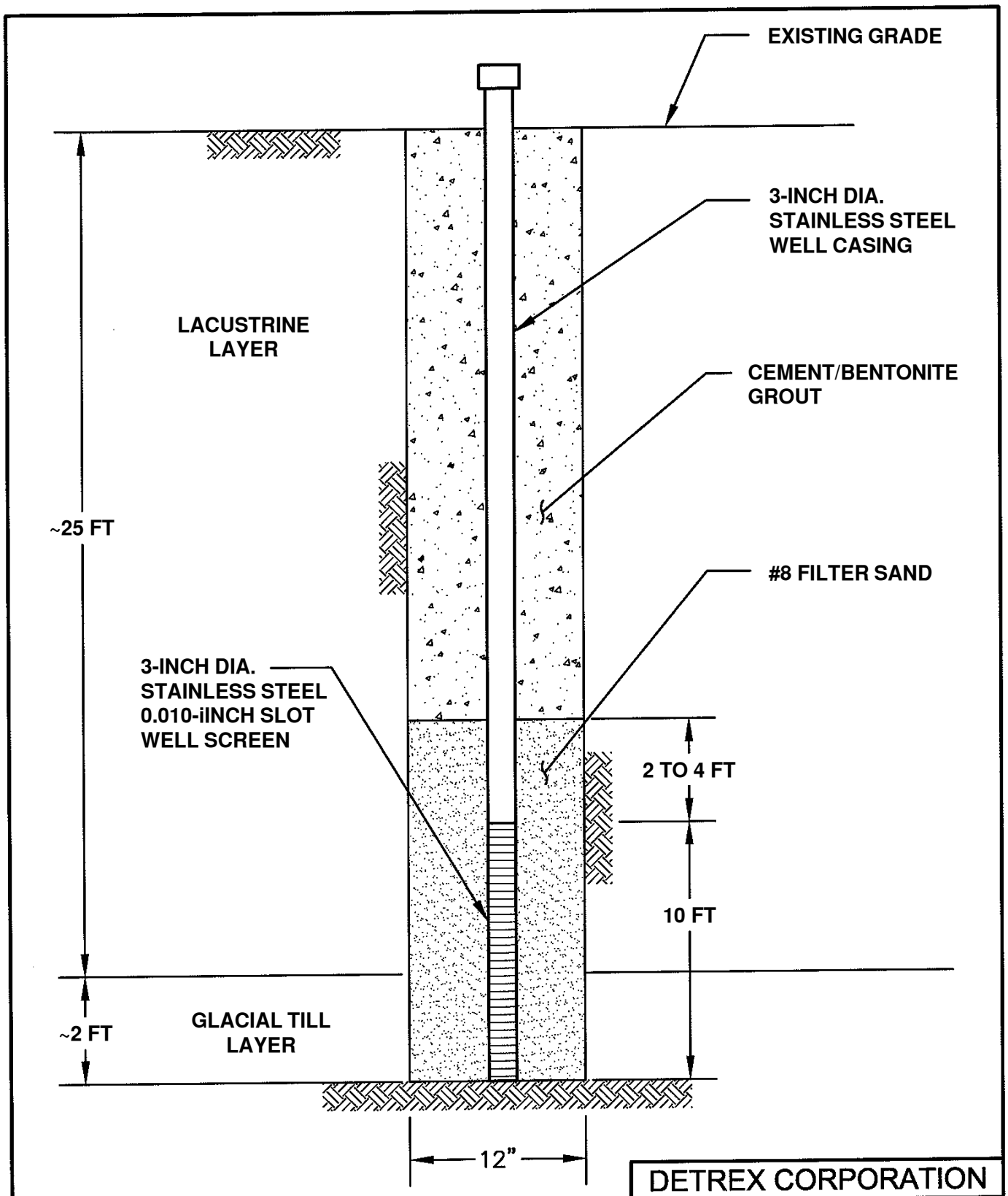



Figure 2-5




DETREX CORPORATION

Figure 3-1

**Proposed Recovery Well Construction Detail**

URS

NOT TO SCALE

P:\D\Detrex\8E06011\DWGs\O&M Plan\FIG3-1.dwg User:shore Dec 20, 2004 - 11:54am

# Preliminary Design Schematic – Mobile DNAPL Recovery Unit (MDRU)

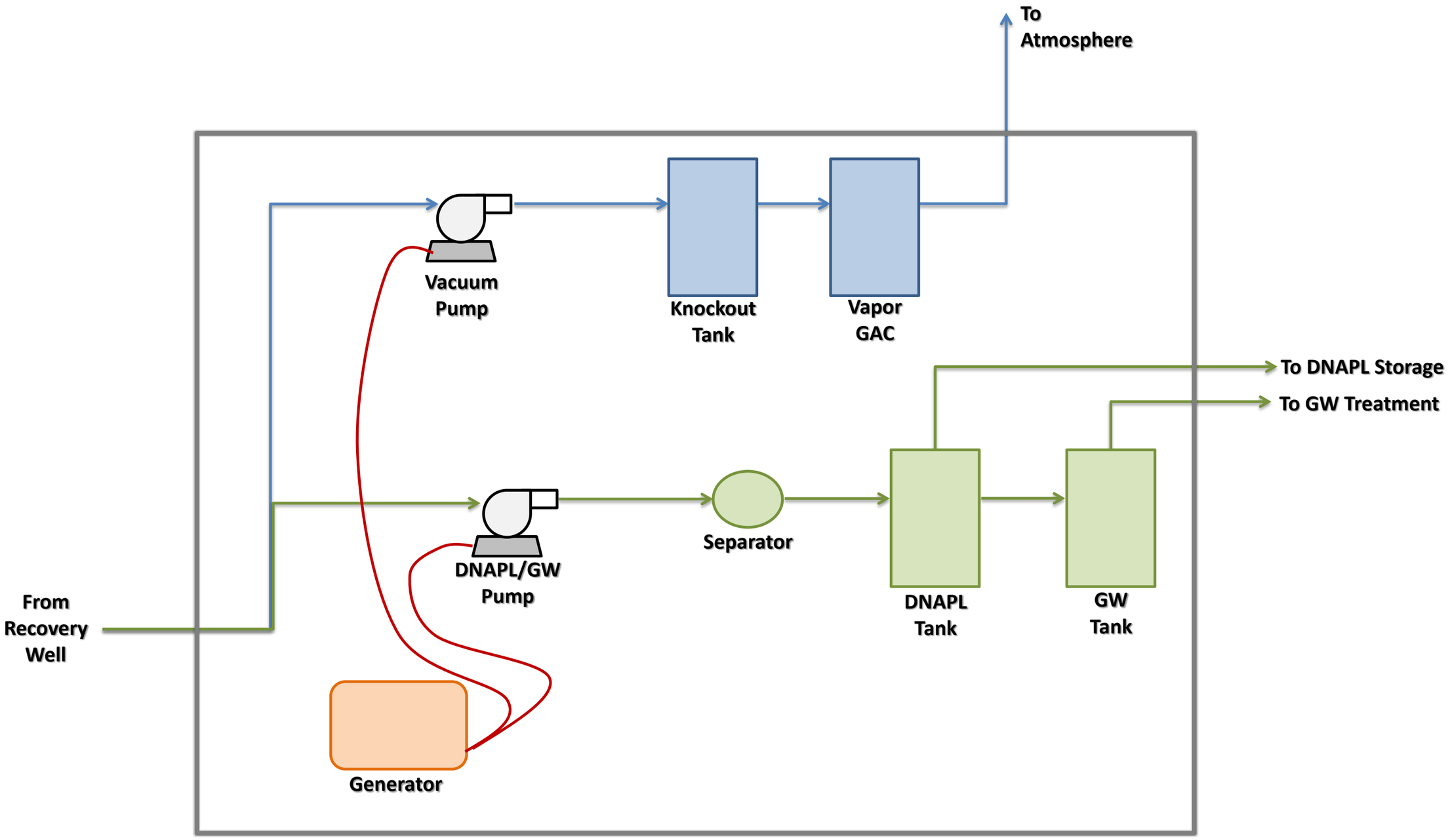
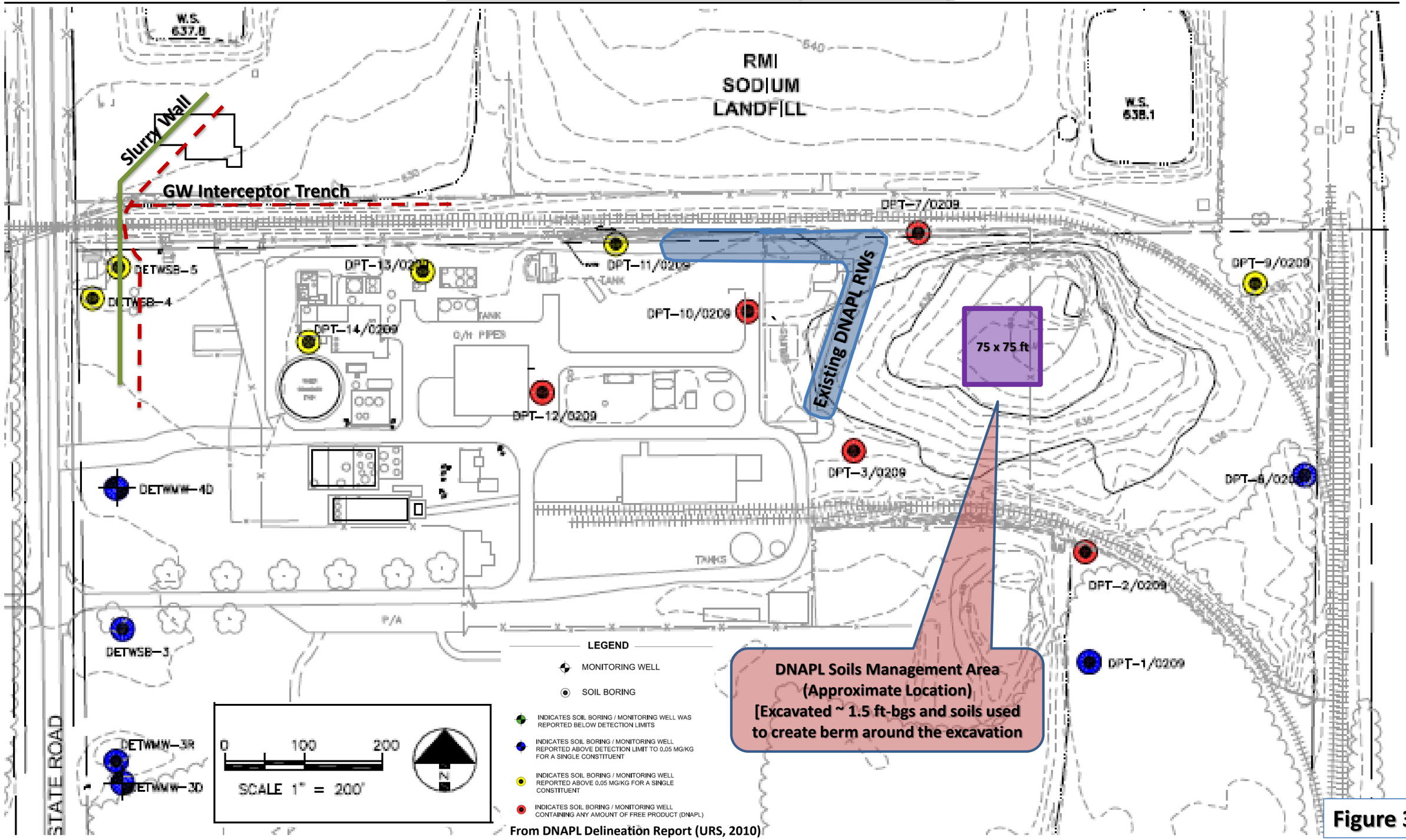



Figure 3-2

# Conceptual Design – DNAPL Recovery Soils Management Area Location

## Detrex Site – Ashtabula, OH (Aerial View)

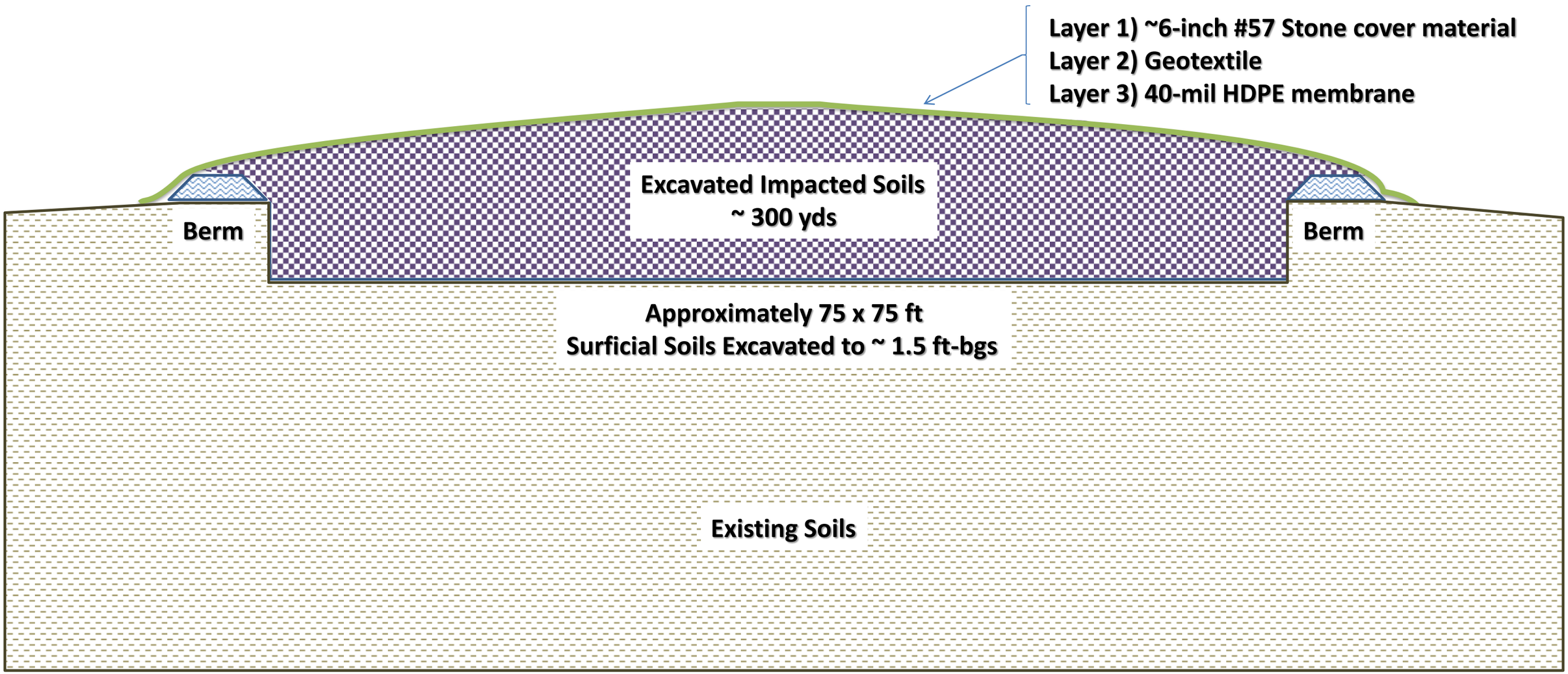



From DNAPL Delineation Report (URS, 2010)

Figure 3-3

# Conceptual Design – DNAPL Recovery Soils Management Area X-Section

**Detrex Site – Ashtabula, OH**

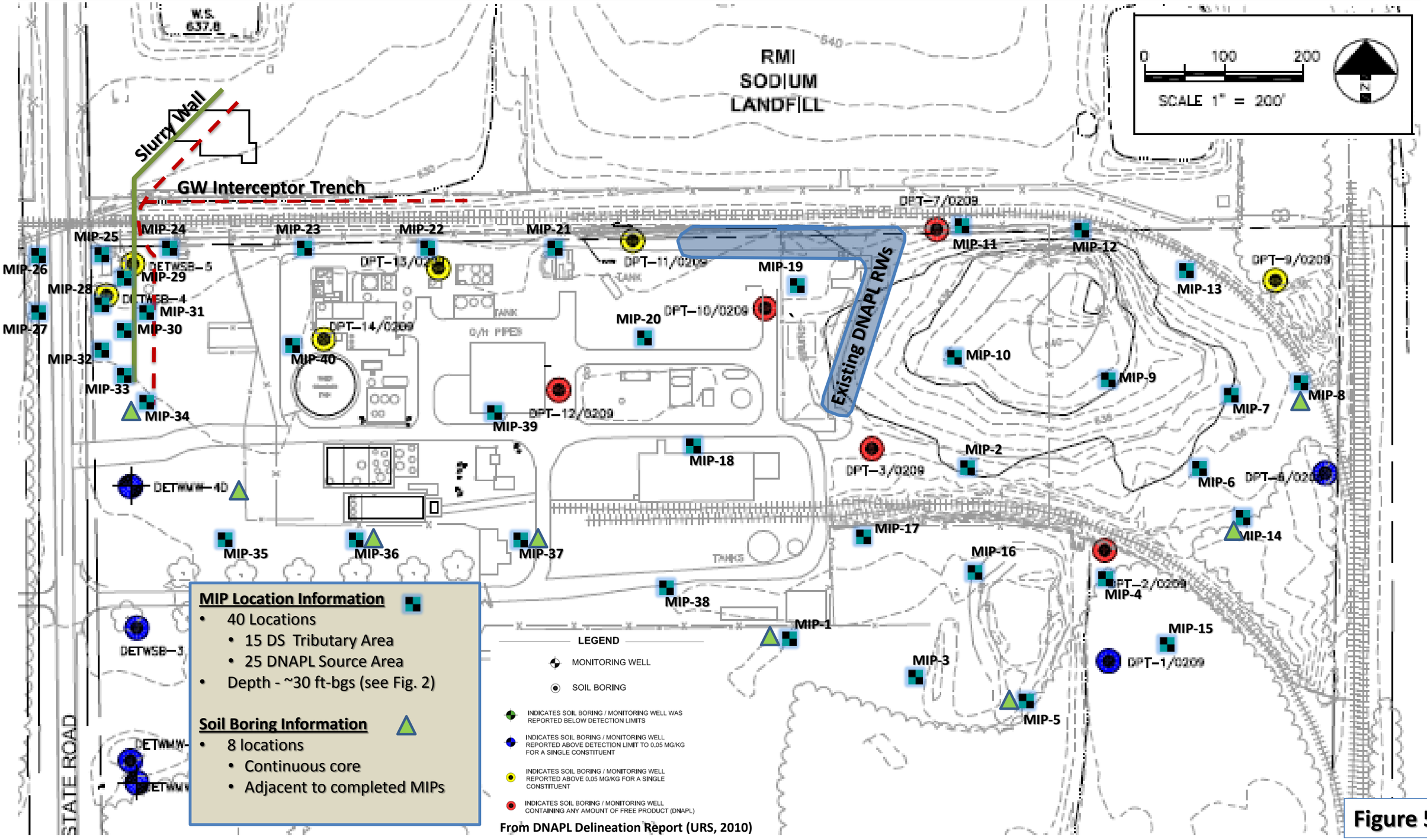



**Note:** Not to Scale

**Figure 3-4**

# Detrex Site Investigation – Proposed MIP & Rotosonic Boring Locations

## Detrex Site – Ashtabula, OH (Aerial View)




**MIP Location Information**

- 40 Locations
  - 15 DS Tributary Area
  - 25 DNAPL Source Area
- Depth - ~30 ft-bgs (see Fig. 2)

**Soil Boring Information**

- 8 locations
  - Continuous core
  - Adjacent to completed MIPs

From DNAPL Delineation Report (URS, 2010)

Figure 5-1

# APPENDICES

# APPENDIX A
## AGENCY CORRESPONDENCE

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, ILLINOIS 60604

REPLY TO THE ATTENTION OF: SR-6J

March 28, 2011

Thomas W. Steib
Operations Manager
Detrex Chemicals Division
Elco Corporation
1100 N. State Road
Ashtabula, OH 44004

Re: Interim Operation and Maintenance Manual
Detrex RD/RA Source Control Area, URS, Inc., June 2008
Proposed Recovery Trench Option for Enhanced Fluid Recovery

Dear Mr. Steib:

The U.S. Environmental Protection Agency (EPA) recognizes the continuing technical challenges Detrex has faced in attempting to optimize its source area DNAPL extraction system. The Operation and Maintenance Manual has two proposals that have not yet been implemented to address the DNAPL source area. First, Section 3.1.5 of the O&M Manual proposed adding an additional transect of pre-packed 3" recovery wells. These new wells were never installed. A work plan that outlines the installation of these wells along the northern border of the facility should be prepared and provided to EPA by May 1, 2011.

The O&M Manual also proposed a DNAPL Recovery Trench as an option to installing more recovery wells. At our February 2011 meeting in Cleveland, you stated that Detrex was interested in moving forward with the trench option and if EPA could provide the necessary regulatory clarification regarding the handling of the excavated material.

We have consulted with staff in our Land and Chemicals Division about this issue and RCRA Land Disposal Restrictions will not be triggered if the following conditions are met:

1. There needs to be an affirmative determination that the materials are remediation waste.
2. The waste material must be kept within the area of contamination.
3. The waste material must be controlled so as to pose no risk of migration.

Provided that you can comply with those conditions, your request to proceed with the recovery trench option is approved. Please provide EPA with a work plan before proceeding with any field work.

I can be reached by phone at 312 886-4843 if you have any questions.

Sincerely,

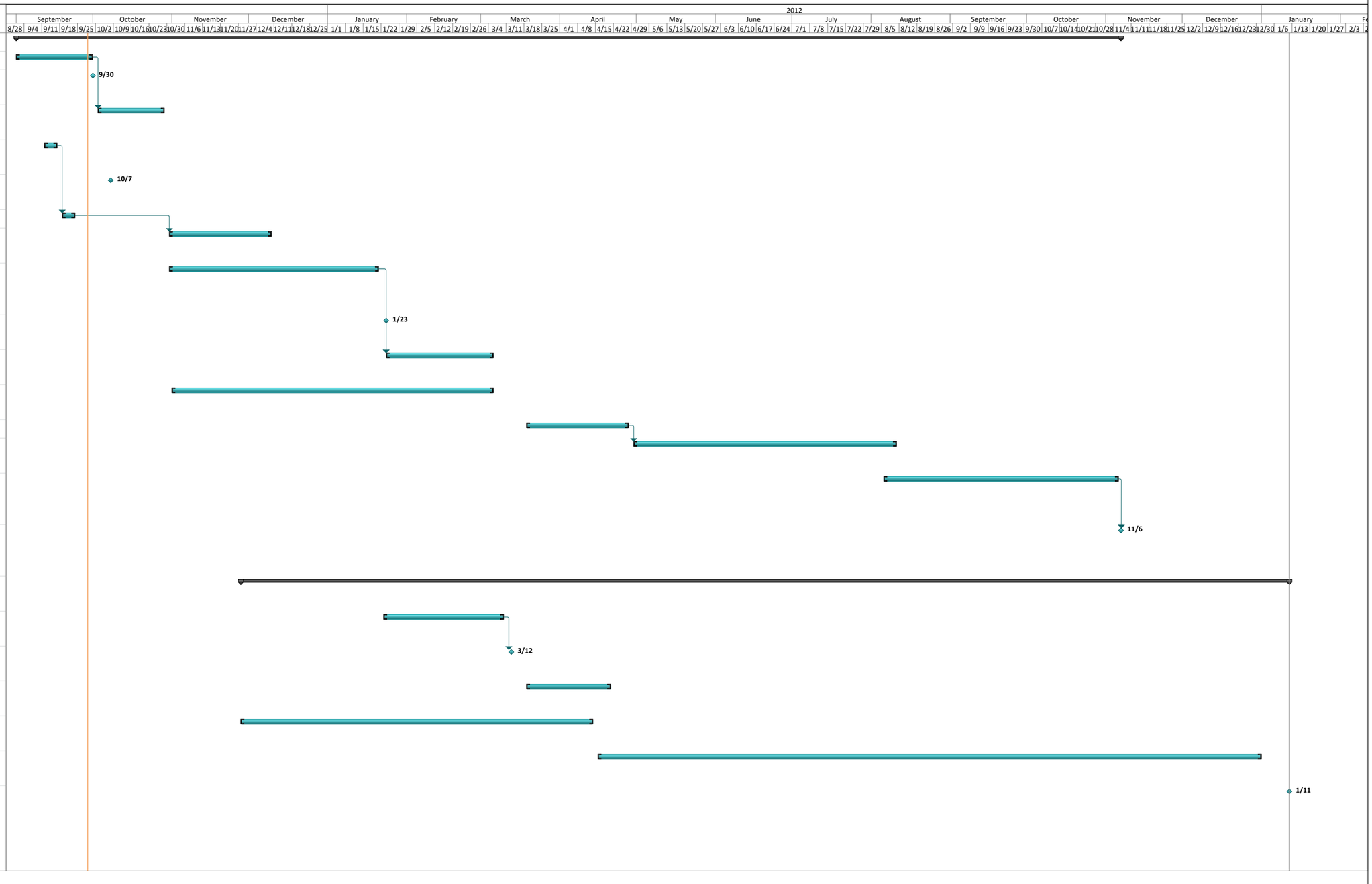
W. Owen Thompson
Remedial Project Manager
Superfund Division

cc: Peter Felitti, U.S. EPA C-14J
William Earle, SulTRAC
Robert Currie, Detrex
Martin Schmidt, URS

# APPENDIX B
# PROJECT SCHEDULE

**Proposed Schedule**
**Slurry Wall RD/RA and ESD**
**Detrex Corporation**
**Ashtabula, Ohio**

| ID | Task Name | Start | Finish | Duration |
|---|---|---|---|---|
| 1 | **Slurry Wall Activities** | **Thu 9/1/11** | **Tue 11/6/12** | **309 days** |
| 2 | Slurry Wall Work Plan | Thu 9/1/11 | Fri 9/30/11 | 22 days |
| 3 | Submittal of Slurry Wall Work Plan | Fri 9/30/11 | Fri 9/30/11 | 1 day |
| 4 | USEPA Review of Work Plan | Mon 10/3/11 | Fri 10/28/11 | 20 days |
| 5 | DS Tributary Sampling / Camera Survey | Mon 9/12/11 | Fri 9/16/11 | 5 days |
| 6 | Submittal of Letter Report to USEPA | Fri 10/7/11 | Fri 10/7/11 | 1 day |
| 7 | DS Tributary Excavation | Mon 9/19/11 | Fri 9/23/11 | 5 days |
| 8 | Slurry Wall Design Investigation | Mon 10/31/11 | Fri 12/9/11 | 30 days |
| 9 | Slurry Wall Design/Specifications Preparation | Mon 10/31/11 | Fri 1/20/12 | 60 days |
| 10 | Submittal of Slurry Wall Design Report to USEPA | Mon 1/23/12 | Mon 1/23/12 | 1 day |
| 11 | USEPA Review of Slurry Wall Design | Tue 1/24/12 | Mon 3/5/12 | 30 days |
| 12 | Development of Detrex ROD ESD | Tue 11/1/11 | Mon 3/5/12 | 90 days |
| 13 | Slurry Wall Bidding | Mon 3/19/12 | Fri 4/27/12 | 30 days |
| 14 | Slurry Wall Implementation | Mon 4/30/12 | Fri 8/10/12 | 75 days |
| 15 | Preparation of Slurry Wall Construction Completion Report | Mon 8/6/12 | Mon 11/5/12 | 66 days |
| 16 | Submittal of Slurry Wall Construction Completion Report | Tue 11/6/12 | Tue 11/6/12 | 1 day |
| 17 | **DNAPL Recovery Activities** | **Mon 11/28/11** | **Fri 1/11/13** | **295 days** |
| 18 | Preparation of OM&M Plan | Mon 1/23/12 | Fri 3/9/12 | 35 days |
| 19 | Submittal of OM&M Plan to USEPA | Mon 3/12/12 | Mon 3/12/12 | 1 day |
| 20 | Recovery Well Installation | Mon 3/19/12 | Fri 4/20/12 | 25 days |
| 21 | Development of Mobile DNAPL Recovery System | Mon 11/28/11 | Fri 4/13/12 | 100 days |
| 22 | Mobile DNAPL Recovery System Implementation | Mon 4/16/12 | Mon 12/31/12 | 186 days |
| 23 | Submittal of Mobile DNAPL Recovery System Operation, Maintenance and Monitoring Performance Report | Fri 1/11/13 | Fri 1/11/13 | 1 day |




Project: Detrex Slurry Wall Sched2
Date: Thu 9/29/11

Task | Milestone | Project Summary | External Milestone | Inactive Milestone | Manual Task | Manual Summary Rollup | Start-only | Deadline
Split | Summary | External Tasks | Inactive Task | Inactive Summary | Duration-only | Manual Summary | Finish-only | Progress

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